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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/594,852

09/29/2006

Hu Wei

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12/03/2010

INTEL/BSTZ

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP

1279 OAKMEAD PARKWAY

SUNNYVALE, CA 94085-4040

EXAMINER

BOWEN, RICHARD L

ART UNIT

PAPER NUMBER

2157

MAIL DATE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/594,852	<b>Applicant(s)</b> WEI ET AL.	
	<b>Examiner</b> RICHARD BOWEN	<b>Art Unit</b> 2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 15-17, 20-22 and 24-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-17, 20-22 and 24-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 March 2009 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Claims 15-17, 20-22 and 24-27 are pending.
2. Claims 1-14, 18-19 and 23 have been cancelled. Claims 24-27 have been added.

### ***Drawings***

3. Figure 6 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

4. The disclosure is objected to because of the following informality: typographical error at page 18 line 6. The sequence code "100, 101, 001, 000" should be replaced with "100, 010, 001, 000" to correct a typographical error. This is apparent; because 101 is repeated twice, and the sentence references that "each group contains forty (40) transactions."

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 15-17, 20-22 and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. ("Mining Frequent Patterns without Candidate Generation: A Frequent-Pattern Tree Approach," *Data Mining and Knowledge Discovery*, Pages 53-87, hereinafter referred to as Han) in view of Zaki et al., "Parallel Classification for Data Mining on Shared-Memory Multiprocessors," pages 1-8, hereinafter referred to as "Zaki").

As per claim 15, Han discloses **a method for mining data of a database, comprising:**

**Identifying transaction items of the database and determining an occurrence frequency for each item:** (a scan of DB derives a list of frequent items,

<(f:4), (c:4), (a:3), (B:3), (m:3), (p:3)>. The frequent items are listed in this ordering in the rightmost column of Table 1.)(e.g. page 57; see also, pages 56 and 58);

**building a probe structure based on the identified frequent transaction items, wherein each branch of the probe structure includes a number of identified transaction items selected based on content of the transaction items and the occurrence frequency of the transaction items, (e.g. algorithm 1 – sort frequent items in support-descending order and generates figure 1)(page 58 and page 60)**

**the selected identified transaction items for each branch to be executed independently;** (single path; since every item in each path is unique, there is no redundant pattern to be generated)(page 66)

**grouping the branches of the probe structure based on the content of each branch;** (the B+-tree structure, can be used to index FP-tree as well. Since there are many operations localized to single paths or individual item prefix sub-trees, such a pattern matching for node insertion, creation of transformed prefix paths for each node, it is important to cluster FP-tree nodes according to the tree/subtree structure.)(page 81)

**building a frequent pattern tree (FP-tree) from the branches of the probe structure;** (examples of fp trees are shown in Figs. 1-4)(pages 58, 60, 62 and 65)

Han does not specifically disclose **assigning, via a master processor, each branch of the FP-tree to one of a plurality of slave processors, each of the plurality of slave processors to execute the transaction items identified by the respective branch, wherein the number of transactions to be executed by each of the plurality of slave processors is substantially equal.**

On the other hand, Zaki, which discloses shared memory parallelization of decision tree construction, discloses **assigning, via a master processor, each branch of the FP-tree to one of a plurality of slave processors, each of the plurality of slave processors to execute the transaction items identified by the respective branch, wherein the number of transactions to be executed by each of the plurality of slave processors is substantially equal.** (the task parallel approach uses dynamic subtree partitioning among processors. A master is responsible for partitioning the processor set. Each group independently executes processes on distinct subtrees. substantially equal is considered to be satisfied by task pipelining and dynamic load balancing to yield faster implementations)(Abstract, pages 1, 3 and 5)

Han relates to data mining using frequent pattern trees. Abstract. On the other hand, Zaki teaches data mining and data parallelism in decision trees. E.g. pages 1, 3 and 5 The parallelism disclosed in Zaki increase the efficiency of data-mining. Abstract on page 1. Zaki discloses using a master and slave and dynamic load balancing to yield faster implementations. Abstract, pages 1, 3 and 5

It would have been obvious to one of the ordinary skill in the art at the time of the applicant's invention to incorporate the use of the master and slave processors of Zaki to the device of Han because both relate to data-mining and decision trees [Han: Abstract; Zaki: Abstract, 1, 3 and 5. Because both Han and Zaki relate to decision trees and data mining, it would have been obvious to one of the ordinary skill in the art at the time of the applicant's invention to substitute and/or modify one method for the other to

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achieve the predictable result of improving dynamic load balancing for faster data mining functions.

As per claim 16, Han and Zaki disclose the method of claim 15. Han further discloses **further comprising scanning a first portion of the database when identifying transaction items of the database, and scanning a second portion of the database when building the probe structure, wherein the probe structure includes an associated number of counts with each branch of the probe structure after scanning the second portion of the database.** (count registers the number of transactions represented by the portion of the path reaching this node, and node-link links to the next node in the FP-tree carrying the same item-name.)(page 57-58 and figure 1)

As per claim 17, Han and Zaki disclose the method of claim 15. Han further discloses **further comprising building the probe structure to include a probe tree and probe table, and using the probe tree and probe table to build the FP-tree for mining the FP-tree to determine frequent data patterns.** (the logic identifies the frequent items and segments each transaction into items and arranges the frequent items in descending order as shown in table I and Example 1)(page 56-57), (if two transactions share a common prefix, the shared parts can be merged using one prefix structure as long as the count is registered properly)(page 57).

As per claim 20, Han and Zaki disclose the method of claim 15. Han further discloses **further comprising partitioning the database according to content of the identified transaction items to obtain the probe structure, wherein the probe structure includes combinations of the identified transaction items and the number of occurrences of one or more content-based transactions.** (the logic identifies the frequent items and segments each transaction into items and arranges the frequent items in descending order as shown in table I and Example 1)(page 56-57), (if two transactions share a common prefix, the shared parts can be merged using one prefix structure as long as the count is registered properly)(page 57).

As per claim 21, Han discloses **a computer-readable non-transitory storage medium having stored thereon instructions, which when executed in a system operate to manage data of a database by:**

**identifying transaction items of the database and determining an occurrence frequency for each item;** (a scan of DB derives a list of frequent items, <(f:4), (c:4), (a:3), (B:3), (m:3), (p:3)>. The frequent items are listed in this ordering in the rightmost column of Table 1.)(e.g. page 57; see also, pages 56 and 58);

**building a probe structure based on the identified frequent transaction items, wherein each branch of the probe structure includes a number of identified transaction items selected based on content of the transaction items and the occurrence frequency of the transaction items,** (e.g. algorithm 1 – sort frequent items in support-descending order and generates figure 1)(page 58 and page 60)

**the selected identified transaction items for each branch to be executed independently;** (single path; since every item in each path is unique, there is no redundant pattern to be generated)(page 66)

**grouping the branches of the probe structure based on the content of each branch;** (the B+-tree structure, can be used to index FP-tree as well. Since there are many operations localized to single paths or individual item prefix sub-trees, such a pattern matching for node insertion, creation of transformed prefix paths for each node, it is important to cluster FP-tree nodes according to the tree/subtree structure.)(page 81)

**building a frequent pattern tree (FP-tree) from the branches of the probe structure;** (examples of fp trees are shown in Figs. 1-4)(pages 58, 60, 62 and 65)

Han does not specifically disclose **assigning, via a master processor, each branch of the FP-tree to one of a plurality of slave processors, each of the plurality of slave processors to execute the transaction items identified by the respective branch, wherein the number of transactions to be executed by each of the plurality of slave processors is substantially equal.**

On the other hand, Zaki, which discloses shared memory parallelization of decision tree construction, discloses **assigning, via a master processor, each branch of the FP-tree to one of a plurality of slave processors, each of the plurality of slave processors to execute the transaction items identified by the respective branch, wherein the number of transactions to be executed by each of the plurality of slave processors is substantially equal.** (the task parallel approach uses dynamic subtree partitioning among processors. A master is responsible for partitioning

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the processor set. Each group independently executes processes on distinct subtrees. substantially equal is considered to be satisfied by task pipelining and dynamic load balancing to yield faster implementations)(Abstract, pages 1, 3 and 5).

It would have been obvious to combine Han and Zaki for the reasons stated in claim 15 above.

As per claim 22, Han and Zaki disclose the computer-readable non-transitory storage medium of claim 21. Han further discloses **wherein the instructions, which when executed in a system operate to manage data of a database further by building the probe structure to include a probe tree and probe table, and using the probe tree and probe table to build the FP-tree for mining the FP-tree to determine frequent data patterns.** (the logic identifies the frequent items and segments each transaction into items and arranges the frequent items in descending order as shown in table I and Example 1)(page 56-57), (if two transactions share a common prefix, the shared parts can be merged using one prefix structure as long as the count is registered properly)(page 57).

As per claim 24, Han discloses **a system comprising:**

Zaki discloses **a master processor;** (e.g. page 5)

Zaki discloses **a plurality of slave processors;** (e.g. page 5)

Han discloses **a database; and** (abstract)

Han discloses **software to Identify transaction items of the database and determining an occurrence frequency for each item:** (abstract)

The remaining limitations are substantially similar to those claimed in claims 15 and 21; therefore they are rejected under the same subject matter. It would have been obvious to combine Han and Zaki for the reasons stated in claim 15 above.

Claims 25-27 are substantially similar to claims 16, 17 and 20 respectively; therefore, they are rejected under the same subject matter.

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 15-17, 20-22 and 24-27 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record, listed on form PTO-892, and not relied upon is considered pertinent to applicant's disclosure.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RICHARD BOWEN whose telephone number is (571)270-5982. The examiner can normally be reached on Monday through Friday 7:30AM - 4:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Kim can be reached on (571)272-7421. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/R. B./  
Examiner, Art Unit 2157  
December 1, 2010

/CHARLES KIM/  
Supervisory Patent Examiner, Art  
Unit 2157